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OF THE BUREAU OF STANDARDS

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NEW INSTRUMENT FOR TESTING PIPETTES

A new instrument, employing a volumetric method, for testing dilution pipettes has been designed by E. L. Peffer, in charge of the bureau's capacity and density section, and constructed in the bureau's shops. The time required to test pipettes by the new method is from one-tenth to one-fifth that required by the weighing method, and the results are of equal accuracy. When it is remembered that 4,200 of these pipettes were tested during the last fiscal year and that for the present year the number will run over 6,000, this constitutes an important economy. The pipettes in question have a ratio of stem to bulb of 1 to 10 or 1 to 100.

The instrument consists of a small horizontal glass cylinder with double walls. The space between the walls is evacuated to reduce temperature effects, and the inner cylinder is filled with a

colored noncorrosive solution. Into the two ends of the cylinder project small steel plungers which may be forced into or withdrawn from the cylinder by the rotation of micrometer screws. These plungers are lapped to size and the area of one is 10 times that of the other. A dome on the upper portion of the cylinder has an opening with a rubber stopper into which the top of the pipette is inserted.

In making a test the liquid is driven up the tube of the inverted pipette by the large plunger to the first division, and a reading is then taken on the micrometer. The liquid is then driven through the bulb and to the first ruling on the stem, where a second reading is taken. The small plunger is then used to drive the liquid up the stem, readings being taken at the required points. The volume of liquid displaced by the large plunger being 10 times that displaced by the small one, the number of turns,

and hence the readings of the two micrometers, will be equal if the ratio of bulb to stem of the pipette is truly 10 to 1.

The micrometer heads used were taken from ordinary depth micrometers and are sealed into the glass with Kotinsky's cement. Even with the vacuum jacket there is a slight temperature effect, but this could be reduced by silvering the walls.

SOME OLD WEIGHTS STILL VARY WITH CHANGES IN HUMIDITY

Certain gold-plated "analytical" weights, tested during the past month, showed such variations with changes in atmospheric humidity that the desired certificate could not be granted. These weights were at least 7 years old. It thus appears to be definitely established that variability of gold-plated, screw-knob weights does not necessarily disappear with age. Moreover, the smaller weights in the set showed a slight gain averaging about 0.1 mg. These changes are quite consistent with the idea that the electroplating salts that cause this variability are likely to cause permanent gain also. The necessity for exercising great care in the washing that is necessary after weights are plated, is again emphasized.

REPAIR OF HEAVY-CAPACITY SCALES

Bulletin No. 1 of the National Scale Men's Association contains the specification for overhauling and repair of heavy-capacity scales, prepared by a special committee of which H. M. Roeser, in charge of the Bureau of Standards Master Scale Depot at Chicago, is the chairman.

Recent investigations have shown that in some cases the practice of renewing pivots in heavy-capacity scales without resealing levers with the new pivots in place is still being followed by unscrupulous or ignorant scale mechanics. To insure the discontinuance of this dangerous practice, the preparation of specifications covering scale repairs was authorized at the annual meeting of the Na-

tional Scale Men's Association in March, 1928.

The specification is divided into 10 major portions—General information, pivots and bearings, loops and connections, weighbeams and accessories, clearances, protection from corrosion, setting of scales (foundations, etc.), weighing performance, new equipment and accessories, and general installation requirements.

The general class of scales covered, nature of repairs referred to, quality of materials, dimensions and proportions of parts, protection of parts, scale performance, and many other matters are treated in clear and concise fashion. A bibliography of heavy-capacity scale specifications is included.

Inquiries concerning this circular should be addressed to United States Bureau of Standards Master Scale Depot, 5800 West Sixty-ninth Street, Clearing Station, Chicago, Ill.

TWENTY-SECOND NATIONAL CONFERENCE ON WEIGHTS AND MEASURES

The Twenty-Second National Conference on Weights and Measures will be held in Washington on June 4 to 7, inclusive. Sessions on the first three days will be held at the Bureau of Standards, and on the last day at the Washington Hotel, which will be the downtown headquarters of the conference. Sessions at the bureau will begin at 10 a. m. and 2 p. m. The session on June 7 will start at 9.30 a. m.

On the afternoon of June 5 a tour will be made through the bureau's laboratories, special attention being paid to the work in weights and measures. All those attending the conference are requested to register immediately upon arrival. This is important for purposes of record and also to insure prompt delivery of messages.

Among the subjects which will come up for discussion are the following: Unusual practices involving weight or measure, identification by linear measurement, weighing in the meat-packing industry, the Federal standard container

act of 1928, development in terminal weighing of grain, gasoline-meter installations in a ramp garage, observations on certain air-operated gasoline-meter installations, the solution of air in gasoline, cooperative program of the American Automobile Association, effect on scale design of highway and motor-truck design, legal status of rules and regulations, person weighing scales, raising the standard for local weights and measures officials, résumé of State legislation introduced or enacted during the current year, uniformity in weights and measures requirements, and specifications and tolerances relative to grease and liquid measuring devices.

There will be the customary reports of the States and of the State associations of weights and measures officials and the citation by officials of important court decisions in their jurisdictions. Other items are under consideration but have not been decided upon definitely.

CONTROL OF CLAY SLIPS BY THE USE OF ELECTROLYTES

The organic matter found in ball clays belongs to the class of protective colloids which also exert a peptizing action. It has been found possible, within limits, to control the time of setting of the body by adjusting the relative amounts of electrolyte and peptizing protective colloid. "Livering" is a condition of the slip in which it is no longer uniformly fluid but appears to have undergone localized coagulation. It was noticed that slips containing no peptizing protective colloid tend to "liver" on standing overnight. The addition of a small amount of tannic acid eliminated this condition in a great many instances. A number of experiments were carried out for the purpose of studying the effect of the addition of peat muck and tannic acid to a body containing no ball clay. The body composition was as follows: 50 per cent English china clay, 30 per cent flint, and 20 per cent feldspar.

With 0.125 per cent Na_2SiO_3 plus 0.125 per cent Na_2CO_3 as electrolyte, and no colloid, 450 ml of water was required, giving an approximate time of setting of

30 minutes and a cross-breaking strength of 14.8 lbs./in.². Using peat muck as the source of the peptizing protective colloid, with 0.8 per cent colloid as carbon, 390 ml of water was required, giving an approximate time of setting of 120 minutes and a cross-breaking strength of 27.9 lbs./in.². Using tannic acid as the source of peptizing protective colloid, 0.8 per cent colloid as carbon, 400 ml of water was required, giving an approximate time of setting of 180 minutes and a cross-breaking strength of 31.6 lbs./in.².

INVESTIGATION OF WATERPROOFING COMPOUNDS

There is now in progress at the bureau an investigation of the effects of a representative number of the many commercial damp proofing and waterproofing compounds that are used in practice to decrease the permeability of concrete. Before the actual investigation of the compounds was started a study of the permeability of plain concrete, without admixtures or coatings, was necessary to determine the type of mixture, methods of fabricating, and the curing, etc., which were to be used in the specimens under investigation. To show the relative merits of the various admixtures and coatings, it was essential to develop a concrete that was permeable to a slight degree and then use this mix in all the specimens that contained the waterproofing compounds.

Specimens 4 inches thick were made using 12 mixes of concrete, ranging from 1:1:5 to a 1:4:6 mix and tested for permeability. The water-cement ratio and the size grading of the sand and gravel were varied for each of these mixes. The tests on these varied mixes showed that a mix of dry consistency was too permeable, but a mix which was wet enough to be workable was practically impervious. The medium flow between these two extremes, which allowed a small amount of water to pass through the specimen, could not be obtained by control of the water alone, so the thickness of the specimen was changed.

It was finally decided to use a specimen 2 inches thick, consisting of 1 part of cement, 3 parts of Potomac River sand, 6 parts of $\frac{1}{4}$ to $\frac{3}{8}$ gravel, and a water-cement ratio of 1.175, as a standard. This mix is put into a cylinder mold 5 inches in diameter and bumped on the flow table instead of puddling or tamping.

After a 7-day curing period in the damp closet the specimens are ready for test. They are placed between two pipe flanges carrying rubber gaskets and tightened so that there is no leakage around the edges. A water pressure of 20 lbs./in.² is then put upon the specimen, and the amount of water passing through it in a specified time is recorded. The permeability will be determined at various times up to one year, but the pressure on the specimens will be maintained at 20 pounds at all times.

TESTS OF KEENE'S CEMENT

At the request of Committee C-11 of the American Society for Testing Materials the bureau has tested a number of representative samples of Keene's cement to obtain data for use in formulating specifications.

The present tentative specifications for Keene's cement (Proc. A. S. T. M., Vol. 28, Part I, p. 816, 1928) require that the cement when mixed to a standard testing consistency as determined by the Southard viscosimeter shall set in not less than two nor more than four hours and shall have a minimum tensile strength of 450 lbs./in.². The mix of standard testing consistency as determined by the Southard viscosimeter is somewhat thinner than that used in practice, and it has been found that most of the Keene's cements tested at the bureau in the past few years have not passed the strength requirement.

Six samples of Keene's cement were received from three of the four American manufacturers and from one Canadian manufacturer. The testing consistency was determined on each sample with the Southard viscosimeter and with the modified Vicat apparatus (Technical News

Bulletin No. 142, February, 1929). The plunger of the modified Vicat apparatus was loaded to 350 g, and a 15 mm penetration was used. The testing consistency as determined with the Southard viscosimeter required from 8 to 10 ml more water for each 100 g of cement than that determined with the modified Vicat apparatus.

The time of set of each cement was determined, using both consistencies, and using both the Vicat and Gillmore needles. The time of set of the thicker mixes as determined with the Vicat needle, varied from 1 to 5½ hours. That determined on the thinner mixes varied from 2 to 12 hours. The time of set as determined with the light Gillmore needle was practically the same as that determined with the Vicat needle, while with the heavy Gillmore needle the time required was considerably longer.

The tensile strength of each cement was determined with both consistencies. With the thicker mix, 5 of the 6 cements showed a tensile strength of more than 450 lbs./in.² after aging 7 days in the laboratory air, while with the thinner mix, 4 of the 6 cements showed a tensile strength of more than 450 lbs./in.². No appreciable difference was found between the 7-day and the 28-day tests, and damp storage of the briquets for 7 days followed by air storage for 7 days showed that no gain in strength over similar briquets stored in air for 14 days had occurred.

As a result of these tests and of similar tests conducted by others it seems desirable to change the requirements for the time of set to not less than 1 nor more than 4 hours, retain the tensile strength requirements of 450 lbs./in.², and substitute the modified Vicat apparatus for the Southard viscosimeter as a method for determining the standard testing consistency.

THERMAL EXPANSION OF BRICKS FOR INSULATING PURPOSES

Recently it was found desirable, in connection with one of the bureau's studies, to determine the thermal ex-

pansion of bricks used for insulating purposes. Expansion determinations from 20 to 1,000° C. were made on three brands of bricks which were immediately available. The results are given, and for comparative purposes expansion data obtained on a good grade of fire-clay brick are included. The curves obtained from data determined on specimens cut from bricks of brands B and C are not greatly unlike those obtained on certain brands of fire-clay brick. The expansion of the specimen cut from brand A was unusually high, the total expansion at 1,000° C. being approximately two and one-half times as great as that of the other two brands. For comparative purposes the average coefficient of expansion obtained between (a) 20 and 200° C., (b) 200 and 600° C., and (c) 20 and 1,000° C. are given for the four different specimens, together with (d) the total expansion at 1,000° C. The values given for the coefficient of expansion per degree centigrade must be multiplied by 10^{-6} , the values for total expansion are expressed in percentage of unit length. For brand A, the value for (a) is 44.2, the value for (b) 28.9, for (c) 13.6, and for (d) 1.325. In the case of brand B the values are (a) 18.5, (b) 3.6, (c) 5.7, and (d) 0.55. For brand C these values are (a) 9.7, (b) 4.9, (c) 5.7, and (d) 0.55. The data obtained on the fire-clay brick for the same ranges in temperatures are as follows: (a) 10.8, (b) 3.9, (c) 5.5, and (d) 0.53.

VISIT OF CERAMIC SOCIETY OF ENGLAND

On the morning of May 4 about 60 delegates from the Ceramic Society of England inspected the bureau's work in the clay products and allied fields.

This visit was part of a tour for the British ceramists arranged by the American Ceramic Society and which includes inspections of the leading manufacturing plants and research laboratories in the United States and Canada.

The trip through the bureau gave the visitors a chance to see the work in progress on clay products, Portland cement, lime and gypsum, stone, and

optical glass, as well as related investigations covering the strength and fire resistance of structural materials.

American ceramists have learned much from the long-established ceramic industry of England, where some of the world's most famous chinaware has been manufactured for years. It was, therefore, particularly gratifying to the bureau to receive this visit and to exhibit some of the apparatus and methods which this country has developed.

FIRE-RESISTANCE TESTS OF BUILDING MATERIALS AND CONSTRUCTIONS

An account of the fire-resistance activities of the bureau was given by S. H. Ingberg on the afternoon of May 2 before the Washington meeting of the American Institute of Refrigeration. The bureau's work has dealt mainly with the fire-resistive properties of materials and members entering into the construction of buildings, the fire hazard of building contents, the severity of fires that can result with given amounts of combustible building contents, and the protection afforded by devices, such as insulated record containers.

Fire resistance incorporated into the building itself has the advantage of being independent of the human element on which fire prevention along many other lines must depend. It loses little in effectiveness with age, remaining practically unchanged as long as the structure serves the purpose for which it was built. While general fire-prevention efforts and fire-detective and fire-prevention devices are of value, the building must remain as the main factor in taking care of the margin due to carelessness, ignorance, and crime that can not otherwise be further reduced. Consistent and continuing reduction in the life and property loss from fire can be safely premised mainly on achieving greater fire resistance of exterior and interior building members, details and finishes, a large gain in which is possible with proper application and combinations of materials now in common use.

The standard fire test consists in subjecting the material, construction, or

device to a furnace fire, the intensity of which is regulated so that given average temperatures obtain in the furnace chamber at stated times after the fire is started. By means of this control approximately the same fire exposure can be obtained at different times and in different laboratories. The other requirements will vary with the type of construction or device tested. Thus, columns are required to support a load approximating that which they would carry in a building. Floor constructions and bearing walls are similarly required to support load and also to resist flame and temperature penetration to an extent that will prevent ignition of materials in contact with the side not exposed to fire. Incombustible finishes, such as plaster, must serve similarly in preventing ignition of the material or construction protected, and insulated containers, such as safes, must preserve their contents. The fire resistance of the material, construction, or device tested is measured by the number of hours and minutes during which these requirements are met in the fire test. Ability to withstand the attack of hose streams, such as are applied in fire extinguishment, is also required for walls, floors, and partitions.

A large number of fire tests of steel, cast iron, concrete, and timber columns, brick and hollow tile walls, plaster partitions, and roofing materials have been conducted on the above bases, the results of which have been published or are being prepared for publication.

A description was also given of tests made to obtain information on the severity of fires in buildings containing different amounts of combustible contents. These results are valuable as indicating the types of buildings for which constructions passing given fire tests are suitable.

HYDROGEN AND CARBON MONOXIDE IN FLAMES

An investigation is being made of the relative amounts of hydrogen and carbon monoxide which escape from gas flames in which combustion is nearly

complete. Information on this subject, which is of importance in connection with the determination of carbon monoxide and also in connection with efficiency of utilization, has heretofore been based upon very meager data and a somewhat uncertain theory. The determination of the two gases when present in concentrations of a few hundredths of 1 per cent is being made by first removing water and carbon dioxide by means of liquid air, burning the reducing gases with the aid of a catalyst, collecting the water and carbon dioxide formed by means of liquid air, and transferring to weighing tubes with a relatively small volume of air.

MEETING OF AMERICAN PHYSICAL SOCIETY

The one hundred and fifty-seventh regular meeting of the American Physical Society was held in Washington, April 18 to 20, inclusive. The meetings on the 18th and 19th were at the Bureau of Standards while that on the 20th took place at the National Academy of Sciences. Because of the number of papers on the program (131) and the limited capacity of the assembly rooms, two sessions were held at the same time, one in the East Building and one in the Industrial Building of the bureau. The meetings were well attended, the total registration being 321.

The program covered a vast range of subjects from electrons to interstellar space, with a fair number of papers on the application of physical measurements to important technical problems.

The following papers were presented by members of the bureau's staff and will be published later in the *Physical Review* (University of Minnesota, Minneapolis, Minn.):

Effect of temperature, pressure, and frequency on the electrical properties of rubber. H. L. Curtis, A. T. MacPherson, and A. H. Scott.

The infra-red absorption spectrum of carbon tetrachloride as related to the Raman spectrum of scattered radiation. W. W. Coblenz and R. Stair.

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The infra-red absorption spectrum of chlorophyl and xanthophyl. R. Stair and W. W. Coblenz.

Quantitative measurements of wind-tunnel turbulence. H. L. Dryden and A. M. Kuethe.

The first spectrum of krypton. W. F. Meggers, T. L. deBruin, and C. J. Humphreys.

Incoherent scattering in Rochelle salt. R. M. Langer.

ELECTROPLATING RESEARCHES AT THE BUREAU OF STANDARDS

During the past few years conferences have been held at the bureau to discuss the progress of researches on electroplating and appropriate subjects for future research by the bureau's staff and by the research associates of the American Electroplaters' Society. This year, at the invitation of the Newark branch and the research committee of the Electroplaters' Society, the conference was held in Newark on April 6. O. J. Sizelove, of the Newark branch, presided at the morning session and R. J. O'Connor, chairman of the research committee, at the afternoon session. About 250 persons attended the meetings, at which the following subjects were presented and discussed:

1. Spotting out.—W. P. Barrows, research associate of the American Electroplaters' Society, presented a summary of his investigation of spotting out. The detailed results of this study are now in press, as a Research Paper of the Bureau of Standards, which will appear about June 1. Copies of this paper will be distributed by the Electroplaters' Society to all of its members and to all subscribers to the research fund.

2. Chromium plating.—A summary of the researches of the bureau on chromium plating was presented by W. Blum, chief of the electrochemistry section of the Bureau of Standards.

3. Analysis of Cyanide Solutions.—M. R. Thompson, of the Bureau of Standards, reported that after many trials very nearly pure sodium and potassium cyanide have been prepared for research purposes.

4. Measurement of pH in Nickel-Plating Solutions.—Methods of measuring pH in nickel-plating solutions were discussed. It is hoped that at the convention of the American Electroplaters' Society in Detroit in July some definite recommendations may be presented.

5. Addition Agents in Copper Electrotyping Solutions.—R. O. Hull, research associate of the International Association of Electrotypers, reported on addition agents in copper electrotyping solutions. He explained that when certain addition agents are used the deposits are smoother and harder than those from solutions with no addition agent. This solution is now being tried on a commercial scale in several electrotyping plants.

6. Iron Deposition.—C. E. Thomas, Bureau of Engraving and Printing, reported on a process for the electrodeposition of iron. This iron has a tensile strength of $4,000 \text{ kg/cm}^2$ ($56,000 \text{ lbs./in.}^2$).

7. Future Plans.—The discussion of future plans emphasized the need for more information regarding the protective value of electroplated coatings against corrosion as a basis for specifications of quality. It was pointed out that the various tests and specifications for zinc and cadmium coatings are not adequate. It was also stated that although chromium plating has been widely applied in the automobile and other industries the present methods and specifications do not yield entirely satisfactory products.

It was suggested that in any study of the protective value of electroplated coatings the Electroplaters' Society and the Bureau of Standards should cooperate closely with committees of the American Society for Testing Materials and similar organizations. The hope was expressed that the automobile industry as well as other metal industries would contribute to the support of such an investigation.

At a subsequent meeting of the executive committee and the research committee of the American Electroplaters'

Society it was decided to have their two research associates undertake a comprehensive study of "Protection against corrosion by means of electroplated finishes." Such a study will probably require about three years. The first subject to be investigated will be the protective value of chromium plating. As soon as possible plans for the study will be prepared and discussed with interested firms and organizations.

PROTECTIVE COATINGS FOR PIPE LINES

The American Gas Association in co-operation with the Bureau of Standards is starting an investigation of protective coatings for pipe lines. A general study of the nature and method of application of the more common types of coatings is now under way. As soon as this is completed a number of manufacturers will be asked to apply their products to pipe samples, and these samples will be buried in a few locations where the corrosion is known to be severe. Some of the samples will be removed at intervals for examination. Each manufacturer will be expected to meet a general specification as to the nature and thickness of the coating.

Manufacturers of coatings should communicate with the bureau in case they wish to have their product considered in the tests which are being planned.

COMMERCIAL STANDARD FOR WALL PAPER

Manufacturers, distributors, and consumers of wall paper, together with others interested, will meet at a general conference to be held at the Commerce Building, Washington, D. C., on May 25, to consider the adoption of a proposed commercial standard for grades of wall paper. All those interested in the subject are invited to attend this conference, which is called for 10 a. m.

The standard is for the protection of the consumer and establishes minimum standards of quality, making no limitations on individual artistry or craftsmanship.

When wall papers are made in accordance with the commercial standard as accepted, it is the intention of manufacturers to mark their goods with a self-certifying label. This label will be the customer's certification that paper so labeled is of good serviceable grade made in conformity to the commercial standard and containing full surface coverage.

PAPER STENCILS FOR ADDRESSING MACHINES

The bureau recently made an endurance test of paper stencils used in addressing machines, which indicated that such stencils are very serviceable if properly made. A paper stencil, taken from stock, was fixed in an addressing machine and prints were made until some of the letters of the test address became illegible. This occurred after over 200,000 prints had been made.

The stencil was one of the recently developed commercial types, composed of stencil tissue set in a laminated cardboard frame, which projects beyond the plane of the tissue on all sides so as to protect the tissue as well as to hold it rigid. The stencil tissue was found to be composed of the Japanese "Kozu" fiber which is derived from the paper-mulberry tree. Paper made of this fiber is noted for its great strength and toughness. The paper had been given a coagulated gelatin coating for the purpose of increasing its resistance to heat, humidity, ink, and water. The frame was composed of 60 per cent rope fiber and 40 per cent of sulphite wood fiber. It was strong and hard and not inclined to warp.

The stencil was prepared according to the usual procedure, which consists of moistening it with water, cutting it on an ordinary typewriter, and finally drying it for a few minutes. The stencil was fixed in a stationary position while printing with it, as for test purposes running it through the machine in the usual manner was impractical. However, the test is believed to duplicate service conditions satisfactorily, as

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apparently in the modern type of machine practically all of the stresses on the stencil tissue are those occurring during the actual printing.

Judging from this test result, there is apparently no question as to the high degree of durability of paper stencils of the type tested, as far as mechanical stresses are concerned. In addition, their aging properties are important, as address stencils are sometimes used for many years, and paper products are always more or less subject to chemical changes which cause them to deteriorate with age. However, the past record of paper stencils in this respect is excellent, and the current products appear to have as good or better permanence qualities than those made in the past.

TABS FOR MILK-BOTTLE CAPS

The tabs for milk-bottle caps sometimes pull loose without removing the caps from the bottles. This trouble is usually encountered only in the summer when the caps become wet from ice used to cool the milk. At the request of a manufacturer of caps, who submitted some samples that were defective in this respect, together with some that were satisfactory, tests were made to locate the defect. A wet tensile test of the caps showed that in the defective ones the staple which secured the tabs pulled out much easier than in the others. This difference in the holding power of the staples is believed to be due to a difference in the way in which they are inserted. In the case of the defective caps the staples were inserted parallel to the grain of the paper, while in the satisfactory ones the position of the staples was across the grain of the paper.

FADING OF DYED TEXTILES IN DAY-LIGHT AND IN CARBON ARC LIGHT

The American Association of Textile Chemists and Colorists and the Bureau of Standards have been studying the fading of dyed textiles with the primary object of developing standard methods for

testing fastness to light. One phase of this work, involving the exposure of over 10,000 individual samples to daylight under various conditions and to carbon arc light, was started in 1926 and has now been completed. A brief outline of the work and some of the results obtained follows. A report by William H. Cady and William D. Appel will be published soon in the American Dyestuff Reporter.

A total of 1,252 specially prepared dyeings on cotton, wool, silk, and weighted silk, representing some 381 different coloring matters, were exposed to daylight in several different ways and to the light from a glass-enclosed carbon arc. Each sample was exposed for four different periods of time. In general, slight fading occurred in the first period, decided fading in the fourth, and intermediate amounts of fading in the other two. Seven sets of samples, all cut from the original dyeings, were exposed in the following ways: Sets A and K in the standard sun test of the American Association of Textile Chemists and Colorists; that is, on clear days between 9 a. m. and 3 p. m., under glass, at an angle of 45° from the horizontal, facing south; set B, simultaneously with sets A and K, but with no glass cover; set D, continuously, under glass in a vertical position, facing south; set E, continuously, under glass, at an angle of 45° from the horizontal, facing south; set F, continuously, under glass, in a vertical position, facing north; set G-H, in the "Fade-ometer," a type of glass-enclosed carbon arc. The results of a sample by sample comparison of the dyeings in the several sets with the corresponding dyeings in set A taken as the standard are given in the paper. It is shown that:

1. The "standard sun test" (set A above) of the American Association of Textile Chemists and Colorists gives essentially reproducible results with reference to the relative fading of the dyeings in the series.

2. The presence or absence of a window-glass cover over the samples during exposure in the standard test has practically no effect on the fading of 74 per cent of the samples and only a slight effect on 22 per cent of them. It has a marked effect on the fading of the remaining 4 per cent.

3. Marked divergences in the relative fading of the dyeings in continuous exposures compared with the fading in the standard exposure are noted. These divergences are most marked in the samples exposed continuously, in a vertical position, facing north. A considerable number of the cotton dyeings faded relatively faster than the wool and silk dyeings in this test. In general, the basic dye types, the indigoids, and the ice colors on cotton fade much faster relative to some other cotton, wool, and silk dyeings in the vertical north exposure.

4. Although the majority of the dyeings fade to about the same extent relative to one another in the arc exposures compared with the standard sun exposures (1 arc hour=1.3 hours in the "standard sun test"), fading in the arc light is different in quality from that in sunlight in many instances. Some samples fade entirely too much, others entirely too little, in the arc exposures, but the agreement between standard sun test and arc test is much better than between the former and the continuous exposure in a vertical position facing north.

Miscellaneous observations on the peculiarities in a behavior of individual dyeings are recorded. A classification of the dyeings for fastness to light and a selection of standards of fastness will be given in another report.

LIST OF WILLING-TO-CERTIFY MANUFACTURERS

The usefulness of the bureau's certification plan depends upon the easy accessibility of a list of willing-to-certify manufacturers as well as a list of laboratories prepared to make check tests of commodities purchased.

The bureau is distributing copies of its Letter Circular No. 256, which consists of 14 mimeographed and 116 printed pages. This letter circular records more than 7,500 requests for listing from about 2,000 "willing-to-certify" manufacturers as sources of supply of commodities covered by 248 United States Government master specifications.

The first 21,000 copies of the circular are being sent to Governmental and institutional buyers, Federal, State, county, and municipal, making purchases out of tax money or its equivalent.

The next in order of distribution will be the officers of trade associations, technical societies, and other interested organizations to whom copies of the circular will be sent for their information and for criticisms and comments. To a relatively small number of other persons copies of the circular will be sent upon specific request.

STANDARD SAMPLES

The renewal No. 30c of the bureau's standard sample No. 30b, chromevanadium steel, has been prepared and is ready for distribution. The new sample has the following composition: Carbon 0.490, manganese 0.71, phosphorus 0.019, sulphur 0.013, silicon 0.236, chromium 0.971, and vanadium 0.24 per cent. The price of this standard is the same as that of No. 30b, \$3 per 150 grams.

STATE UTILITY COMMISSION ENGINEERS CONFERENCE

The seventh annual conference of State Utility Commission Engineers will be held at the Bureau of Standards on May 31 and June 1. A tentative program has been sent out, and 15 States have already indicated their intention to send representatives. The widespread interest in these meetings is indicated by the fact that engineers will be present from Massachusetts, California, Oklahoma, and Florida, and from the Province of Quebec, Canada.

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NEW AND REVISED PUBLICATIONS
ISSUED DURING APRIL, 1929Journal of Research¹

Bureau of Standards Journal of Research, Vol. 2, No. 4, April, 1929 (RP Nos. 50 to 59, inclusive). Obtainable only by subscription. (See footnote.)

Research Papers

(Reprints from Journal of Research)

RP50. Apparatus for thermomagnetic analysis; R. L. Sanford. Price, 10 cents.

RP51. The analysis of fluorspar; G. E. F. Lundell and J. I. Hoffman. Price, 5 cents.

RP52. An interference method for determination of axial and oblique aberrations; A. H. Bennett. Price, 10 cents.

RP53. Determination of molecular weights in the vapor state from vapor pressure and evaporation data; E. W. Washburn. Price, 5 cents.

RP54. The sulphoaluminates of calcium; W. Lerch, F. W. Ashton, and R. H. Bogue. Price, 10 cents.

RP55. An analysis of the arc and spark spectra of yttrium (Yt I and Yt II); W. F. Meggers and H. N. Russell. Price, 10 cents.

RP56. The precise measurement of X-ray dosage; L. S. Taylor. Price, 10 cents.

RP57. Note on an electrical conductance method for determining liquefaction temperatures of solids; E. W. Washburn and E. R. Smith. Price, 5 cents.

RP58. Calibration of sixty-five 35-yellow Lovibond glasses; I. G. Priest, Deane B. Judd, K. S. Gibson, and G. K. Walker. Price, 10 cents.

RP59. The compressive and transverse strength of brick; J. W. McBurney. Price, 5 cents.

Technologic Papers¹

Supplement to Technologic Paper No. 349; inserts for pages 548, 568, and 582. Free on application to the Bureau of Standards.

Volume 22, Technologic Papers of the Bureau of Standards; Nos. 353 to 370 (bound in cloth). Price, \$3..

Circulars¹

C372. Recommended specification for quicklime and hydrated lime for use in soap making. Price, 5 cents.

United States Government Master Specifications

USGMS 23c. Lamps, electric, incandescent, large, tungsten filament. Price, 5 cents.

1930 Supplement to USGMS 23c. Price, 5 cents.

USGMS 553. Metal bases for plaster and stucco construction. Price, 5 cents.

USGMS 581. Tires, bicycle, single tube and clincher. Price, 5 cents.

Technical News Bulletin¹

TNB145. Technical News Bulletin, May, 1929. Obtainable only by subscription. (See footnote.)

OUTSIDE PUBLICATIONS²

A system of frequency measurement based on a single frequency. E. L. Hall; Proceedings, Institute of Radio Engineers (New York, N. Y.), Vol. 17, No. 2, p. 272; February, 1929.

The gaseous explosive reaction. F. W. Stevens; National Advisory Committee for Aeronautics (Washington, D. C.), Technical Report No. 305; 1929.

Cathode ray dosimetry. F. L. Mohler; Radiology (Chicago, Ill.), Vol. 12, p. 294; 1928.

Incoherent scattering. R. M. Langer; Nature (London, England), March 9, 1929.

¹ Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Bureau of Standards Journal of Research, \$2.75; other countries, \$3.50.

² "Outside publications" are not for distribution or sale by the Government. Request should be sent direct to publishers.

Soundproofing apartment houses—Part one. V. L. Chrisler; *Architectural Forum* (New York, N. Y.), p. 623; April, 1929.

Progress in hydraulic engineering through laboratory experimentation. Herbert N. Eaton, *Journal of the Worcester Polytechnic Institute* (Worcester, Mass.), Vol. XXXII, No. 7, p. 91; April, 1929.

Paper research literature, VII, a list of contributions by members of the Bureau of Standards, Department of Commerce, 1928. C. J. West and B. W. Scribner; *Paper Trade Journal* (New York, N. Y.), Vol. 88, No. 16, p. 57; April 18, 1929.

The carburizing test for quality in case hardening steels. S. Epstein and H. S. Rawdon; *Industrial Gas* (New York, N. Y.), Vol. 7, p. 20; April, 1929.

Determining value of pipe coatings. K. H. Logan; *Oil and Gas Journal* (Tulsa, Okla.), Vol. 27, No. 50, p. 33; May 2, 1929.

Determination of the source and means of prevention of stones in glass. Herbert Insley; *Journal, American Ceramic Society* (Columbus, Ohio), Vol. 12, No. 3, p. 143; March, 1929.

A study of crystalline compounds formed in slags on boiler-furnace refractories. T. A. Klinefelter and E. P. Rexford; *Preprint from Transactions, American Society of Mechanical Engineers* (New York, N. Y.). Paper presented at Rochester meeting, May, 13, 1929.

Aurora of March 11. Hugh G. Boutell and Mary M. Boutell; *Popular Astronomy* (Northfield, Minn.), Vol. XXXVII, No. 4, p. 249; April, 1929.

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